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Model Modules to Assist Assessing and Controlling Stress Corrosion Cracking #126
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Hydrogen diffusion and concentration accumulation with stress under anodic dissolution is considered for parametric and functional relations, the atomic hydrogen formed from the reactants in the electrolytic solution at the interface and later diffused to the metallic structure accumulates up to a critical magnitude that influences on the stress profiles near a crack tip, once the active site transforms from a small site to a short crack. The life prediction model considers four steps in which the nucleation of a small pit (or active site) growths and within a colony of active sites formed by the anodic dissolution conditions of NN solution and the breakdown of corrosion products due to the stress induced in the layer forms a short crack; when a crack is formed, the crack rate propagation process involves several magnitudes like stress, hydrogen concentration, and anodic dissolution. The hydrogen formed in the first step of the model which is the nucleation of an active site diffuse and reaches a critical magnitude that start to consider important for the crack rate propagation, this magnitude is considered along with material characteristics (dislocation).

We introduced EIS (Electrochemical Impedance Spectroscopy) as an electrochemical tool to characterize the interface metal-electrolyte at different conditions during slow strain rate measurements before potentiodynamic experiments. Low frequency spectra is difficult for the monitoring of the mechanism at the interface of the NNSCC process, however the on going research considers EIS as a possible technique to follow not only anodic dissolution but interfacial changes due to stress and hydrogen influence.

Furthermore, theoretical calculation will provided cyclic softening parametric relationships on NNSCC conditions where microplasticity influence experimental variables. By considering different cyclic conditions we can characterize theoretically the crack rate and stress profile assuming different crack size (pit or active sites) and operation conditions that give the stress profile.